

TAXONOMIC NOTES ON *NORDLANDIELLA DIAZ* AND *GANASPIDIUM WELD* (HYMENOPTERA: FIGITIDAE: EUCOILINAE)

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Abstract.—*Nordlandiella semirufa* (Kieffer), **n. comb.**, is described and figured. This represents the second species of *Nordlandiella* Diaz, and extends the distribution of this genus into Mexico, Arizona, Hawaii, Texas, Nicaragua, Belize, and Chile. *Nordlandiella semirufa* is reported here as a parasitoid of *Melanagromyza* sp. (Diptera: Agromyzidae), feeding in flower heads of *Bidens* spp. (Asteraceae) in Hawaii. The genus *Ganaspidium* Weld is reviewed; *Ganaspidium utilis* Beardsley is a **new synonym** of *Ganaspidium nigrimanus* (Kieffer), **n. comb.** *Nordlanderia merickeli* Miller and *Nordlanderia navajoe* Miller are recognized as *nomina dubia*. All known species of *Ganaspidium* and *Nordlandiella* are parasitoids of Agromyzidae (Diptera).

Key Words: *Nordlandiella*, *Ganaspidium*, *Melanagromyza*, Eucoilinae, Figitidae, Agromyzidae, Cynipoidea

In late 1999, three specimens of an unidentified species of eucoiline were sent to me by the late J.W. Beardsley. I recognized that they belonged to *Nordlandiella* Diaz, 1982, and I matched these specimens to several specimens on loan from the American Entomological Institute (AEICC), Gainesville, FL and the Cornell University Insect Collection (CUIC), Ithaca, NY. These specimens, however, did not agree with the description of *N. abdominalis* Diaz, 1982, the only species placed in *Nordlandiella*. The holotype of *Cothonaspis semirufa* Kieffer, 1907, agrees precisely with that of the unidentified specimens collected and reared in Hawaii, as well as material from the AEICC and CUIC. Originally *C. semirufa* was placed in *Cothonaspis* Hartig, 1840 (Kieffer 1907); Weld (1952) moved this species to *Trybliographa* Förster, 1869. This species does not possess any of the diagnostic features of either *Cothonaspis* (Nordlander, 1976) or *Trybli-*

grapha (Nordlander, 1981), but does possess the diagnostic features of *Nordlandiella*. Thus, *Nordlandiella semirufa* (Kieffer), **n. comb.**, is proposed. Since the original description of *C. semirufa* lacks mention of a number of critical features, a redescription of the species is provided below.

The first Hawaiian specimens of *Nordlandiella semirufa* were collected by J.W. Beardsley and W.D. Peneira on 20 February 1996 while sweeping miscellaneous weeds and low crops at the University of Hawaii Agricultural Experiment Station farm, Waimanalo, Oahu, HI. The species was recognized by J.W. Beardsley as being a newly established immigrant to Hawaii, since no other eucoilines like it had been recorded from Hawaii previously in extensive surveys (Yoshimoto 1962; Beardsley 1986, 1988, 1989). Additional female specimens were collected by W.D. Peneira during May of 1996. Host associations were made possible by M. Ramadan, Hawaiian Depart-

ment of Agriculture, who, in April of 1996, reared several female *N. semirufa* from the puparia of an unidentified species of *Melanagromyza* Hendel (Diptera: Agromyzidae) feeding in the flower heads of *Bidens pillosa* L. (Asteraceae); these collections were made at Kunia, Oahu, HI. Additional reared material was made available for my examination by M. Trostle, Department of Entomology, Texas A&M University (College Station, TX), who reared several males and females from a species of *Melanagromyza* feeding in the flower heads of *Bidens* sp. collected on Oahu, HI.

This paper includes a review of *Ganaspidium* Weld as a follow up to Beardsley's (1986) review of the genus. Similarly to *Nordlandiella*, all species of *Ganaspidium* have been recorded as primary parasitoids of Agromyzidae (Beardsley 1986). Current data suggests that *Ganaspidium* and *Nordlandiella* are not closely related (Fontal-Cazalla et al. 2002; Buffington, unpublished data).

Descriptive terminology follows that of Fontal-Cazalla et al. (2002) and Buffington (2002). All newly acquired specimens were either card mounted or point mounted. Examination of specimens was conducted using a Leica MZ8 stereomicroscope illuminated with fluorescent desk lamps. Scanning electron micrographs were made using a Phillips XL-30; a full set of images for *Nordlandiella* and *Ganaspidium* are available at <http://www.morphbank.com> (Morphbank server operated by Fredrik Ronquist, Uppsala University, Sweden). Digital stereoscope images were made using a JVC digital camera mounted on a Zeiss SV6 stereoscope; images were optimized using Automontage© 4.0 software.

Specimens were borrowed from the following institutions:

- AEICC: American Entomological Institute, Gainesville, FL, USA.
 BPBM: Bernice P. Bishop Museum, Honolulu, HI, USA.

- CASCC: California Academy of Sciences, San Francisco, CA, USA.
 CUIC: Cornell University Insect Collection, Ithaca, NY, USA.
 EMEC: Essig Museum Entomology Collection, University of California, Berkeley, CA, USA.
 MLPA: Museo de La Plata, La Plata, Argentina.
 UCRC: University of California, Riverside, Research Collection, Riverside, CA, USA.
 USNM: National Museum of Natural History, Smithsonian Institution, Washington DC, USA.

Nordlandiella Diaz

Nordlandiella Diaz 1982: 323–325. Type species, *Nordlandiella abdominalis* Diaz, by original designation.

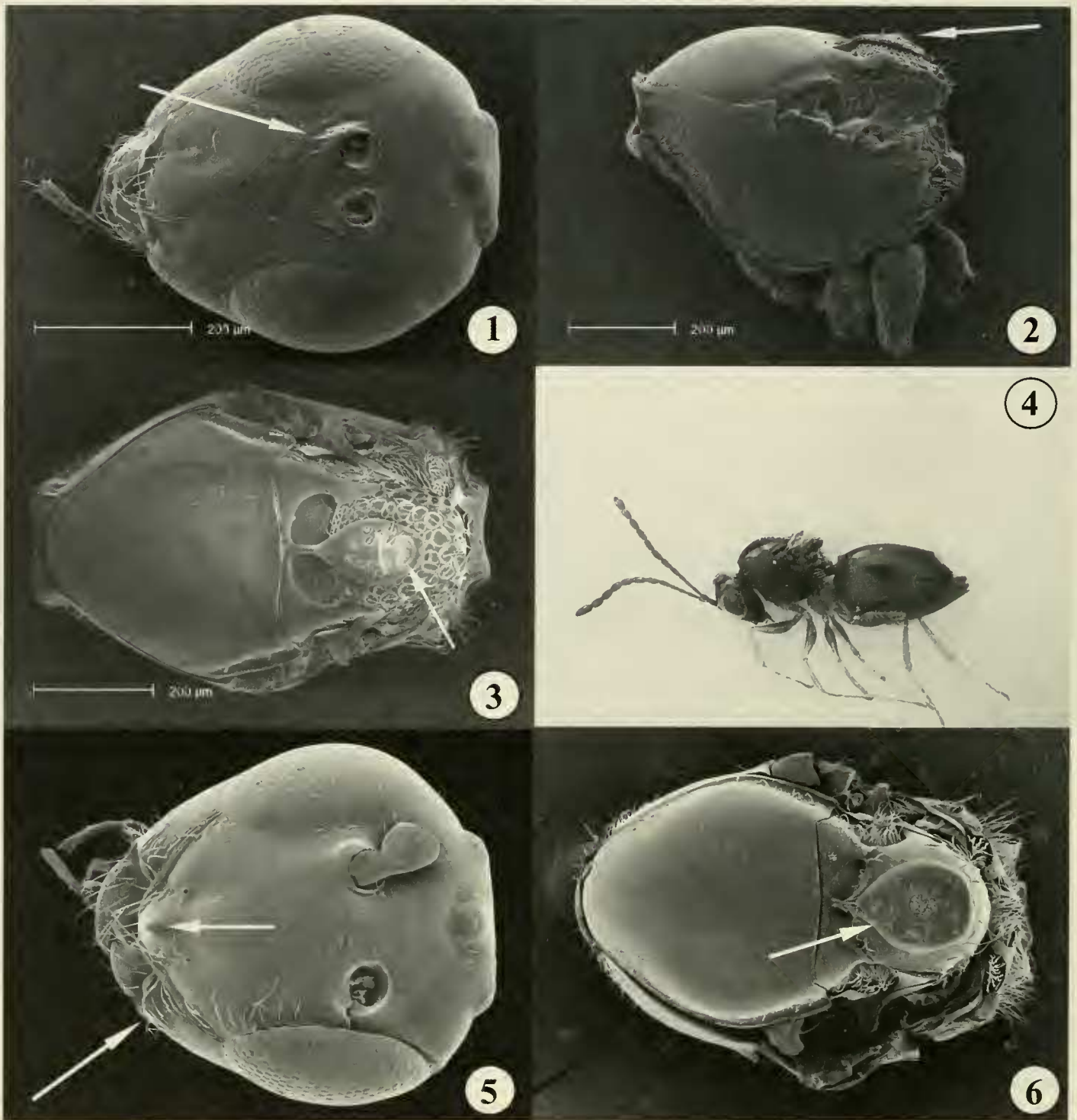
Diagnosis.—Key features unique to members of this genus concern the morphology of the frons adjacent to the toruli, and the morphology of the scutellar plate: prominent single dorso-ventral groove present adjacent to outer margin of each torulus (Fig. 1, arrow); small to medium sized protuberance (Fig. 2, arrow) present in center of scutellar disk, with mid-pit (Fig. 3, arrow) located posteriorly; broad pits surround protuberance, each containing a single seta (Fig. 3).

Included species.—*N. abdominalis* Diaz, 1982; *N. semirufa* (Kieffer), **new combination**.

Nordlandiella semirufa (Kieffer), **new combination** (Figs. 1–4)

Cothonaspis (*Anectoclis*) *semirufa* Kieffer 1907: 137. Lectotype hereby designated.
Trybliographa semirufa: Weld 1952: 222.

Lectotype.—For the purposes of nomenclatural stability, one of the three specimens included in Kieffer's (1907) description is herein designated lectotype, and the remaining two specimens designated paralectotypes. LECTOTYPE, ♀, San Marcos,



Figs. 1–6. 1–4, *Nordlandiella semirufa*. 5–6, *Gauaspidium nigrimanus*. 1, Head, anterior view, arrow indicates presence of dorso-ventral groove adjacent to torulus. 2, Mesosoma, lateral view, arrow indicates distinct protuberance in center of scutellar plate. 3, Mesosoma, dorsal view, arrow indicates posterior positioning of scutellar mid-pit. 4, General habitus of *N. semirufa*. 5, Head, anterior view, arrow indicates presence of clypeal and malar conical protuberances. 6, Mesosoma, dorsal view, arrow indicates scutellar plate.

Nicaragua. Coll. Baker. CASC #10604; the specimen is in good condition with the locality data label followed by Kieffer's determination label (large red label), depository label and my lectotype label. Two additional specimens, which correspond with two additional collection localities in Kieffer's (1907) description, are hereby desig-

nated as paralectotypes: BELIZE: #5640 (1 ♀) (paralectotype); NICARAGUA: San Marcos, Coll. Baker, 5654 (paralectotype); each are labeled 'paralectotype'.

Diagnosis.—*Nordlandiella semirufa* has shorter grooves adjacent to the antennal socket (not extending past the midline of eye) than *N. abdominalis* (extending ven-

trally past midline of eye) and *N. semirufa* possesses an entirely reddish-colored metasoma (all black to chestnut colored in *N. abdominalis*).

Description.—*Head*: Nearly glabrous with a few scattered setae on anterior facet of mandibles and anterior margin of clypeus. Upper and lower face lacking sculpture, save for a short, deep furrow lateral to each antennal socket. Malar sulcus a single groove. Malar space smooth, lacking any protuberance. Gena smooth and rounded.

Antenna: Female with 13 segments, moniliform, slightly clavate; segments 3–12 subequal in size; segment 13 about 1.5× length of segment 12. Male with 15 segments, segment 3 modified, laterally excavated, curved outwardly.

Pronotum: Pronotal plate narrow, with a few scattered setae present dorsally; dorsally crested, bifurcate; pronotal fovea open. Junction between pronotum and mesoscutum smooth and lacking sculpture. Lateral aspect of pronotum smooth, with a few scattered setae (Fig. 2).

Mesoscutum: Smooth with very few scattered setae; lacking sculpture entirely (Fig. 3).

Mesopectus: Upper part and lower part of mesopleuron smooth and glabrous. Mesopleural triangle an indistinct shallow impression. Mesopleural carina simple; lower part of mesopleuron bordered by a simple precoxal carina.

Scutellum: Scutellar plate small, with mid-pit situated posteriorly; center of plate with a distinct protuberance (Fig. 2, arrow); pits bearing setae present on dorsal surface; posterior margin rounded. Dorsal surface of scutellum reticulate with large, irregular fovea and setae; margined slightly posteriorly and laterally; projections absent.

Metapectal-propodeal complex: Metapectus glabrous with a few scattered setae present posteriorly. Dorsal margin of spiracular groove well defined, ventral margin indistinct. Posterior margin of metapectus with a thin ridge. No other metapectal ridges present (Fig. 2). Anteroventral cavity

semi-circular, setose. Propodeum with short, thin setae; propodeal carinae non-parallel, bent at junction with auxillary propodeal carinae; auxillary propodeal carinae indistinct. Nucha glabrous, reticulate.

Wings: Hyaline, asetose basally with an increase in setae distally; margin with distinct setal fringe (Fig. 4). R1 vein complete; radial cell always closed.

Legs: Fore- and midcoxae about equal in size; hind coxa slightly larger. All coxae variably covered in setae; mid- and hind coxae with distinct setal patches (Fig. 2). Femora and tibiae sparsely setose; tarsomeres with distinct, appressed setae.

Metasoma: Female: Distinctly larger than mesosoma. Thin hairy ring present at base of syntergum, remainder of metasoma glabrous. Micropunctures present on posterior ¼ of syntergum, and on remaining terga. Terga posterior to syntergum directed posteriorly at about 70° angle (Fig. 4). Male: as in female, but terga posterior to syntergum directed ventrally at a 90° angle.

Material examined:—BELIZE [see types]. ECUADOR: Rio Chota, 10.VI.1965, 1,800 m, Luis Peña (1 ♀; AEIC). MEXICO: Yau-tepec, Canyon d Lobos 13.III.1959, 4,000 ft, HE Evans (1 ♀ 1 ♂; CUIC); Yau-tepec, Canyon d Lobos 7.III.1959, 4,000 ft, HE Evans (1 ♀ 2 ♂; CUIC); Morelos, Tlayacapan, 29.X.1982, screen sweeping, J.T. Huber (1 ♀; UCRC); Chiapas, Puebla Nuevo, 20.III.1958, RC Bechtel, E.I. Schlinger (1 ♀; EMEC). NICARAGUA: [see types]. USA: FLORIDA, Paradise Key, 5.IV.1951, H&M Townes (1 ♀; AEIC); Florida City, 27.III.1936 (2 ♀; AEIC); HAWAII: Oahu, Waimanalo at UH Farm, el. 60–80 ft, 20.II.1996, sweeping weeds & crops. JW Beardsley & WD Pereira, (3 ♀; BPBM, 3 ♀; UCRC); Oahu, Waimanalo at UH Farm, el. 60–80 ft, 15–22.V.1996, yellow sticky borad trap, WD Pereira, (2 ♀; BPBM); Oahu, Tantalus Dr., el. 1500', on *Bidens pilosa* 28.V.1997, WD Pereira, (1 ♀; BPBM); Oahu, Kunia, 8.IV.1999, ex *Melanagromyza* sp. in *Bidens pilosa* flower heads, M. Ramadan/99-137 (3 ♀; BPBM); Oahu, Honolulu Co., Pali Lookout, 8 mi W

of Jonet Hwy HI and Hwy 61, 25.VI.2001, ex *Bidens* sp., MK Trostle and SC Ruth (14 ♀; UCRC).

Distribution.—Neotropical and Nearctic regions: Belize, Ecuador, Mexico, Nicaragua, USA (Florida, Hawaii (Oahu)) (see above list of localities).

Biology.—I have examined specimens reared from *Melanagromyza* spp. (Agromyzidae) infesting flower heads of *Bidens pilosa* L. (J.W. Beardsley and W.D. Perreira, personal communication), and *Melanagromyza* spp. infesting flower heads of *Bidens* sp. (M.K. Trostle, personal communication).

Ganaspidium Weld

Ganaspidium Weld 1955: 274. Type species, *Ganaspidium pusillae* Weld, by original designation.

Diagnosis.—Prominent conical protuberances present on the clypeal and malar space (Fig. 5); notaulices completely lacking (Fig. 6); hairy ring on base of metasoma present and complete. *Ganaspidium* can be separated from *Nordlanderia* Quinlan by the latter having well-developed notaulices and lacking a hairy ring at the base of the metasoma.

Discussion.—Weld (1955) proposed this genus to accommodate a new species of eucoiline (*G. pusillae*) reared from leaf mining flies in the Winter Garden area of southern Texas. Beardsley (1986) reviewed the genus, described one new species (*G. utilis* Beardsley) and wrote a key to Hawaiian species. Preliminary phylogenetic data (Buffington, unpublished data) weakly supports the inclusion of *Ganaspidium* within the *Gronotoma* group of genera (*sensu* Fontal-Cazalla et al. 2002), a basal clade of Eucoilinae that specialize on parasitizing Agromyzidae. *Ganaspidium hunteri* and *G. nigrimanus* share a number of synapomorphic features (e.g., a broad, flat scutellar plate with a large central mid-pit; Fig. 6), whereas *G. pusilla* is highly autoapomorphic (e.g., possessing a small, narrow scutellar

plate with a pair of distinct tubercles on either side of the mid-pit).

Upon comparison of the types for *Eucoela nigrimanus* Kieffer, 1907, and *Ganaspidium utilis* Beardsley, 1988, it was clear that these two species are synonymous (synonymy above). Kieffer (1907) most likely placed *E. nigrimanus* in *Eucoila* (also spelled *Eucoela*) due to broadness of that genus concept at the time. Weld (1952) moved *E. nigrimanus* to *Pseudoeucoila* Ashmead, which is in itself a junior synonym of *Leptopilina* Förster (Nordlander 1980). Type specimens for all species examined are in good condition.

Distribution.—Neotropical Region: Chile, Argentina, Panama, Costa Rica, southern Mexico. Nearctic Region: Northern Mexico, continental United States, southern Canada (all three described species). Indo-Pacific Region: Hawaii.

Biology.—Several species in the agromyzid genus *Liriomyza* have been recorded as hosts (Weld 1955, Harding 1965, Beardsley 1986, Johnson 1987, Hara and Matayoshi 1990, Acosta and Cave 1994). *Ganaspidium hunteri* and *G. nigrimanus* have been evaluated for their usefulness in biological control (Johnson 1987, Lynch and Johnson 1987, Mason and Johnson 1988, Rathman et al. 1991, Rathman et al. 1995). Petcharat and Johnson (1988) studied the larval stages of *Ganaspidium nigrimanus*.

Included species.—*G. hunteri* (Crawford). *Eucoila hunteri* Crawford 1913: 310, holotype in USNM; *Ganaspidium hunteri*: Beardsley, 1986. *G. nigrimanus* (Kieffer), **new combination**. *Eucoela nigrimanus* Kieffer 1907: 138, holotype in CASC (#10573). *Pseudoeucoila nigrimanus*: Weld 1952: 235. *Ganaspidium utilis* Beardsley 1988: 44–46, holotype and paratypes in BPBM, **new synonymy**. *G. pusillae* Weld 1955: 274, holotype and paratypes in USNM. Examination of the type series of *Ganaspidium pusillae* revealed that one paratype is *Disorygma pacifica* (Yoshimoto), reared from *Liriomyza pusilla*; this

specimen bears the label “*Disorygma*” in Nordlander’s handwriting.

Notes on the Status of Nearctic *Nordlanderia*

Miller (1989) described two species of eucoiline wasps that were placed in *Nordlanderia* Quinlan (Quinlan 1986). Though the location of the type specimens for these two nominal species is unknown (Miller, personal communication), it is clear from the scanning electron micrographs that accompany the descriptions that these two species possess many of the diagnostic features of *Ganaspidium* but not all of the diagnostic features of *Nordlanderia* (e.g., both species lack notaulices on the mesoscutum and possess a complete hairy ring at base of metasoma). Therefore, *N. navajoe* Miller and *N. merickeli* Miller are regarded as *nomina dubia* until the holotypes can be located and compared to species of *Ganaspidium*.

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